

CLAIMS

1. A communications system supporting communication of packet
5 data, comprising a network with a number of packet data core
nodes (SGSN, CGSN) handling connections with mobile stations
(MS), said system further supporting a functionality of
prolonging packet switched (PS) signalling connections between a
mobile station (MS) and a network packet data node (SGSN; CGSN),
10 c h a r a c t e r i z e d i n t h a t
at least some of said packet data nodes comprise means for
providing information to a mobile station, having sent a request
on an established signalling connection to the packet data node,
as to whether a PS signalling connection is, or is to be,
15 prolonged or not.

2. A communication system according to claim 1,
c h a r a c t e r i z e d i n t h a t
said means in said packet data node uses a response message for
20 responding to said request from the mobile station to include an
indication as information as to whether a PS signalling
connection is prolonged or not.

3. A communication system according to claim 2,
25 c h a r a c t e r i z e d i n t h a t
the response message is an existing response message
particularly defined for the specific request from the mobile
station.

30 4. A communication system according to any one of claims 1-3,
c h a r a c t e r i z e d i n t h a t
the response message comprises an acceptance message concerning
the request received from the mobile station.

5. A communication system according to claim 4,
c h a r a c t e r i z e d i n t h a t
the request comprises a request for connection to the network.

5 6. A communication system according to claim 5,
c h a r a c t e r i z e d i n t h a t
the request comprises an attach request.

7. A communication system according to claim 5,
10 c h a r a c t e r i z e d i n t h a t
the request comprises a request for updating of the registration
of the actual routing area of the mobile station.

8. A communication system according to any one of the
15 preceding claims,
c h a r a c t e r i z e d i n t h a t
the request from the mobile station further includes a request
for prolongation of the signalling connection with the packet
data node.

20 9. A communication system according to any one of claims 1-7,
c h a r a c t e r i z e d i n t h a t
the request from the mobile station only consists of the request
itself, i.e. no additional request for prolongation of the
25 signalling connection with the packet data node, and in that the
decision to prolong the signalling connection or not exclusively
is taken by the packet data node.

10. A communication system according to any one of the
30 preceding claims,
c h a r a c t e r i z e d i n t h a t

it comprises a UMTS and in that the packet data node comprises a serving GPRS support node, an SGSN or a CGSN, i.e. a combined SGSN-GGSN (Gateway GPRS Support Node).

5 11. A communication system according to claim 10,
c h a r a c t e r i z e d i n t h a t
the prolongation request comprises a Follow-on Request (FOR).

10 12. A communication system according to claims 6 or 7,
c h a r a c t e r i z e d i n t h a t
the response message comprises an attach accept message or a
routing area update accept message, and in that an existing,
non-used part in an information element (IE) of the concerned
15 signalling connection is prolonged or not.

13. A communication system according to claim 12,
c h a r a c t e r i z e d i n t h a t
the non-used part of the information element comprises one bit,
20 which can be set to 0 or 1, 0 e.g. indicating that the
signalling connection is not prolonged, 1 e.g. indicating that
the signalling connection is prolonged.

14. A communication system according to claim 13,
25 c h a r a c t e r i z e d i n t h a t
the request is an attach request and in that a remaining non-
used bit in an attach result element (IE) is used, or that the
request is a routing area update request and in that a non-used
bit in an update result information element (IE) is used.

30 15. A system according to any one of the preceding claims,
c h a r a c t e r i z e d i n t h a t

a mobile station receiving an upper layer request only sends such request on to the packet data node when no specific mobility management (GMM) specific procedure is running, i.e. it delays the request if such a procedure is running, and includes a request for a prolonged signalling connection when such procedure is terminated, unless the signalling connection anyhow is prolonged.

16. A packet data node used in a communications system supporting packet switched (PS) communication and handling connections with mobile stations and supporting a functionality of prolonging packet switched signalling connections with a mobile station,

characterized in that

it comprises means for providing information to a mobile station, which has sent a request to the packet data node over an established signalling connection, as to whether the packet data node is prolonging the established signalling connection.

17. A packet data node according to claim 16,

characterized in that

it uses a response message for responding to said request from the mobile station, said response message including an indication as to whether the established PS signalling connection is prolonged or not.

18. A packet data node according to claim 17,

characterized in that

the response message comprises an existing response message particularly defined for the specific request, e.g. a mobility management request, from the mobile station.

19. A packet data node according to claim 17 or 18,
c h a r a c t e r i z e d i n t h a t
the response message comprises an acceptance message concerning
the request received from the mobile station.

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20. A packet data node according to claim 18 or 19,
c h a r a c t e r i z e d i n t h a t
the request comprises a request for connection to the network,
e.g. an attach request, or a request for updating the
10 registration of the actual routing area of the mobile station.

21. A packet data node according to any one of claims 16-20,
c h a r a c t e r i z e d i n t h a t
the received request further includes a request for prolongation
15 of the signalling connection, which is considered by the packet
data node upon determining whether the signalling connection is
prolonged or not.

22. A packet data node according to any one of claims 16-20,
20 c h a r a c t e r i z e d i n t h a t
in the packet data node a decision is made as to whether the
established signalling connection will be prolonged or not,
independently of whether a prolongation request has been
included in the request from the mobile station for a particular
25 procedure or not.

23. A packet data node according to any one of claims 16-20,
c h a r a c t e r i z e d i n t h a t
the packet data node may prolong the signalling connection also
30 when no request therefor is received.

24. A packet data node according to any one of claims 16-23,
c h a r a c t e r i z e d i n t h a t

it comprises an SGSN or a CGSN.

25. A packet data node according to any one of claims 16-24,
c h a r a c t e r i z e d i n t h a t
5 the prolongation request comprises a Follow-on Request (FOR).

26. A packet data node according to claim 24 or 25,
c h a r a c t e r i z e d i n t h a t
the response message issued by the packet data node comprises an
10 Attach accept message or a Routing Area Update accept message,
and in that an existing (non-used) part of an information
element (IE) of the concerned request message is used to provide
the information as to whether the signalling connection is
prolonged or not.

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27. A mobile station used in a communication system supporting
communication of packet data,
c h a r a c t e r i z e d i n t h a t
it comprises control means for establishing whether it should
20 request prolongation or not of an signalling connection
established with a packet data node in the core network of the
packet data communication system, and for requesting
prolongation, if appropriate, from the packet data node, and for
establishing, based on a response message from the packet data
25 node, whether prolongation has been performed or not,
irrespectively of whether the mobile station sent a request
therefor or not.

28. A mobile station according to claim 27,
30 c h a r a c t e r i z e d i n t h a t
the mobile station control means includes a request for
prolongation of an established signalling connection in a

request for a mobility management procedure to the packet data node.

29. A mobile station according to claim 28,
5 c h a r a c t e r i z e d i n t h a t
the request for a mobility management procedure comprises a request for being attached to the network or for updating the routing area of the mobile station, e.g. an Attach request or a Routing Area Update request, and in that upon reception of a
10 response message, the control means are able to determine whether the established signalling connection is prolonged or not.

30. A mobile station according to claim 29,
15 c h a r a c t e r i z e d i n t h a t
the control means delays or rejects upper layer requests to the packet data node if a specific mobility management (GMM) procedure is running, and when such is terminated, includes a request for prolongation in a request towards the packet data
20 node.

31. A mobile station according to any one of claims 27-30,
c h a r a c t e r i z e d i n t h a t
the control means controls the actions concerning communication
25 with the packet data node depending on the information in received information messages.

32. A method in a communication system supporting communication of packet data, relating to packet switched communication
30 between a mobile station and a packet data node, comprising the step of:

- establishing a signalling connection between the mobile station and the packet data node;

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characterized in that
it further comprises the steps of:

- transmitting, from the mobile station, a request message to the packet data node;
- 5 - determining in the packet data node whether the signalling connection should be prolonged;
- informing the mobile station in a response message whether the signalling connection is prolonged or not;
- controlling actions in the mobile station in dependence on
10 whether the signalling connection is prolonged or not.

33. A method according to claim 32,
characterized in that
it further comprises the step of:

- 15 - sending a request from the mobile station to the packet data node for prolongation of a signalling connection, whereby said request for prolongation is included in a mobility management request, e.g. an attach request or a routing area update request.

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34. A method according to claim 32 or 33,
characterized in that
it comprises the step of; on the packet data node side:

- including the information message in an existing, defined
25 acceptance message relating to the received request using a spare part of an information element of said acceptance message, the acceptance message e.g. being an Attach accept or a Routing Area Update accept.

30 35. A method according to any one of claims 32-34,
characterized in that
it comprises the steps of; on the mobile station side:

- establishing, after sending a request message, whether there is any pending upper layer request, if yes, rejecting or delaying the request until a running mobility management procedure is finished;
- 5 - receiving the information as to whether the signalling connection is prolonged or not in the acceptance message from the packet data node;
- if the signalling connection is prolonged, sending the pending upper layer request, unless it was rejected;
- 10 - if the signalling connection is not prolonged, releasing the signalling connection.

36. A method according to any one of claim 32-35,
c h a r a c t e r i z e d i n t h a t
15 the system is a UMTS system, the packet data node being a SGSN
or a CGSN.

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